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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/812,365	03/20/2001	Naoki Kusunoki	PW 024 5694	1740

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EXAMINER

SHAAWAT, MUSSA

ART UNIT

PAPER NUMBER

2128

DATE MAILED: 11/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/812,365

Applicant(s)

KUSUNOKI ET AL.

Examiner

Mussa A Shaawat

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) * | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>20 March 2001</u> . * | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is responsive to application # 09/812,365, filed on March 20, 2001. Claims 1-20 are presented for examination.

Claim interpretation

2. Independent claims 1, 9, and 15 recite “making reference to the first and second lengths to add or eliminate the boundary points”. Examiner interprets “making reference to the first and second lengths to add or eliminate the boundary points” to mean checking the length of the first and second line segments against values and therefore adding or eliminating boundary points accordingly.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. **Claims 1-20 are rejected under 35 U.S.C. 101 because the claimed invention is drawn to non-statutory subject matter.** The Examiner submits that Applicant's have not recited any limitations relating to a practical application in the technological arts and have merely claimed a manipulation of abstract ideas (mathematical constructs). Section 2106 [R-2] (Patentable Subject Matter - Computer-Related Inventions) of the MPEP recites the following: “In practical terms, claims define nonstatutory processes if they: - consist solely of mathematical operations without some claimed practical application (i.e., executing a “mathematical algorithm”); or - simply manipulate abstract ideas, e.g., a bid (Schrader, 22 F.3d at 293-94, 30 USPQ2d at 1458-59) or a bubble hierarchy (Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759), without some claimed practical application.”

In this case, claims 1-20 are drawn to generating boundary points on a string, obtaining first length of a line segment between boundary points, calculating displacement of boundary point, and moving boundary point by displacement. Specifically, claims 1, 9, and 15 are drawn to the manipulation of abstract ideas (mathematical constructs).

An invention which is eligible for patenting under 35 U.S.C. § 101 is in the “useful arts” when it is a machine, manufacture, process or composition of matter, which produces a concrete, tangible, and useful result. The fundamental test for patent eligibility is thus to determine whether the claimed invention produces a **“useful, concrete and tangible result.”** The test for practical application as applied by the examiner involves the determination of the following factors:

(1) “Useful” - The Supreme Court in *Diamond v. Diehr* requires that the examiner look at the claimed invention as a whole and compare any asserted utility with the claimed invention to determine whether the asserted utility is accomplished.

(2) “Tangible” - Applying *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), the examiner will determine whether there is simply a mathematical construct claimed, such as a disembodied data structure and method of making it. If so, the claim involves no more than a manipulation of an abstract idea and therefore, is nonstatutory under 35 U.S.C. § 101. In *Warmerdam* the abstract idea of a data structure became capable of producing a useful result when it was fixed in a tangible medium, which enabled its functionality to be realized.

(3) “Concrete” - Another consideration is whether the invention produces a “concrete” result. Usually, this question arises when a result cannot be assured. An appropriate rejection

under 35 U.S.C. § 101 should be accompanied by a lack of enablement rejection, because the invention cannot operate as intended without undue experimentation.

The Examiner respectfully submits, under current PTO practice, that the claimed invention does not recite either a useful, concrete, or tangible result and is merely drawn to a manipulation of abstract ideas.

- The invention is not useful since the method of claims 1, 9, and 15 do not recite a result that is useful in the technological art. This makes it difficult to determine Applicant's invention since it merely claims a manipulation of abstract ideas. While the preamble of claims 1, 9, and 15 cite a simulation method as the use, the limitations of the claimed method steps merely appear to manipulate an abstract idea and do not recite a useful simulation result. (The patent eligibility standard requires **significant functionality to be present to satisfy the useful result aspect** of the practical application requirement. See *Arrhythmia*, 958 F.2d at 1057, 22 USPQ2d at 1036.)
- The claims are not tangible since, for example, the results of "calculating displacement", and "moving boundary point according to the displacement" are undefined. (see claims 1,9, and 15)
- The claims are not concrete because the results are not assured. For example, is a solution possible for any and all arbitrary inputs? (i.e. displacement of boundary point).

Dependent claims 2-8, 10-14, and 16-20 incorporate the deficiencies of the claims from which they depend on. Therefore they are rejected for incorporating such deficiencies.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

3. Claim 1-20 rejected under 35 U.S.C. 112, second paragraph, because they lack antecedent basis.

Claims 1, 9 and 15 recites the terms " the boundary point" in lines 9, 11 and 12 of claims 1,9 and 15. There is insufficient antecedent basis for this limitation in the claim.

Dependent claims 2-8, 10-14, and 16-20 incorporate the deficiencies of the claims from which they depend on. Therefore they are rejected for incorporating such deficiencies.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsutoshi Nakamura US Patent No. (6,192,330) referred to hereinafter as Nakamura in view of Applicant Admitted Prior Art US Pub. No. (2001/0025233) referred to hereinafter as AAPA.

Re claim 1, Nakamura teaches a simulation method comprising: generating plural boundary points on a string formed on the surface of a material (see col.6 lines 12-13); obtaining a first length of a line segment between the boundary points (see col.11 lines 28-29, col.12 lines 58-62); obtaining a second length of the line segment between the boundary points after the boundary point is moved (col.13 lines 13-18).

Nakamura fails to teach the step of calculating the displacement of the boundary points, moving the boundary point by displacement, and to add or eliminate boundary point in reference to first and second length.

However AAPA teaches the steps of calculating a displacement of the boundary point according to a process model (see paragraph [0007, lines 7-8]); moving the boundary point by the displacement (see paragraph [0007, lines 7-9]); and making reference to the first and second lengths to add or eliminate the boundary point (see paragraph [0008, lines 9-11], see paragraph [0009, lines 1-3]).

It would have been obvious to one of the ordinary skill in the art at the time of the applicant's invention to combine the teachings of AAPA and Nakamura, AAPA teaching of calculating the displacement of the boundary point, moving the boundary points accordingly and adding or eliminating boundary point in reference to first and second line segments would allow users of Nakamura's method to improve the accuracy of calculating the surface region of a semiconductor device.

Re claim 2, Nakamura teaches generating plural boundary points on a string formed on the surface of a material (see col.6 lines 12-13).

Nakamura fails to teach the step of moving the boundary points by the calculated displacement when the displacement is greater than a displacement tolerance.

However AAPA teaches the step of calculating the displacement of the boundary point P, and when the displacement is greater than a displacement tolerance $r_1 \geq 1_{\max}$ adding (moving) the boundary point according to the calculated displacement r_1 , which reads on the claimed

moving the boundary points by the calculated displacement when the displacement is greater than a displacement tolerance (see paragraph [0007, lines 7-9], paragraph [0008]).

It would have been obvious to one of the ordinary skill in the art at the time of the applicant's invention to combine the teachings of AAPA and Nakamura, AAPA teaching of calculating the displacement of the boundary point, moving the boundary points accordingly and adding or eliminating boundary point in reference to first and second line segments would allow users of Nakamura's method to improve the accuracy of calculating the surface region of a semiconductor device.

Re claim 3, Nakamura teaches a obtaining a first length of a line segment between the boundary points (see col.11 lines 28-29, col.12 lines 58-62); obtaining a second length of the line segment between the boundary points after the boundary point is moved (col.13 lines 13-18).

Nakamura fails to teach the step of adding a new boundary point to line segment when the second length is greater than 1.

However AAPA teaches the step of adding a new boundary point to the line segment when the second length is greater than value of 1 (see paragraph [0008, lines 4-11]).

It would have been obvious to one of the ordinary skill in the art at the time of the applicant's invention to combine the teachings of AAPA and Nakamura, AAPA step of calculating the displacement of the boundary point, moving the boundary points accordingly and adding or eliminating boundary point in reference to first and second line segments would allow users of Nakamura's method to improve the accuracy of calculating the surface region of a semiconductor device.

Re claim 4, AAPA teaches a method as in claim 3, wherein the first factor is 4 or less (see paragraph [0008, lines 9-10]).

Re claim 5, Nakamura teaches the step of obtaining a first length of a line segment between the boundary points (see col.11 lines 28-29, col.12 lines 58-62); obtaining a second length of the line segment between the boundary points after the boundary point is moved (col.13 lines 13-18).

Nakamura fails to teach the step of eliminating one of the boundary points of the line segment when the second length is smaller than 1.

However AAPA teaches the step of eliminating one of the boundary points of the line segment when the second length is smaller than value of 1 (see paragraph [0009, lines 1-10]).

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to combine the teaching of AAPA and Nakamura, AAPA step of calculating the displacement of the boundary point, moving the boundary points accordingly and adding or eliminating boundary point in reference to first and second line segments would allow users of Nakamura's method to improve the accuracy of calculating the surface region of a semiconductor device.

Re claim 6, AAPA teaches a method as in claim 5, wherein the second factor is 0.25 or more (see paragraph [0009, lines 9-10]).

Re claim 7, Re claim 5, Nakamura teaches the step of obtaining a first length of a line segment between the boundary points (see col.11 lines 28-29, col.12 lines 58-62); obtaining a second length of the line segment between the boundary points after the boundary point is moved (col.13 lines 13-18).

Nakamura fails to teach the step of eliminating one of the boundary points of the line segment when the first length is smaller than 1.

However AAPA teaches the step of eliminating one of the boundary points of the line segment when the first length is smaller than value of 1 (see paragraph [0009])

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to combine the teaching of AAPA and Nakamura, AAPA step of calculating the displacement of the boundary point, moving the boundary points accordingly and adding or eliminating boundary point in reference to first and second line segments would allow users of Nakamura's method to improve the accuracy of calculating the surface region of a semiconductor device.

Re claim 8, AAPA teaches a method as in claim 7, wherein an inverse of the first factor accords to the second factor (see paragraph [0009]).

Re claim 9, the limitations of claim 9 are the same limitations of claim 1; therefore it is rejected based on the same rationale, *supra*.

Re claim 10, the limitations of claim 10 are the same limitations of claim 2; therefore it is rejected based on the same rationale, *supra*.

Re claim 11, the limitations of claim 11 are the same limitations of claims 3 and 4; therefore it is rejected based on the same rationale, *supra*.

Re claim 12, the limitations of claim 12 are the same limitations of claims 5 and 6; therefore it is rejected based on the same rationale, *supra*.

Re claim 13, the limitations of claim 13 are the same limitations of claim 7; therefore it is rejected based on the same rationale, *supra*.

Re claim 14, the limitations of claim 14 are the same limitations of claim 8; therefore it is rejected based on the same rationale, *supra*.

Re claims 15-20, the limitations of claims 15-20 contain the same limitations of claim 9-14; therefore they are rejected based on the same rationale, *supra*.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Meng US Patent No. (5,386,374) Method for simulating the surface contours of a layer material to be formed over a base structure.
- Leon et al. US Patent No. (5,586,230) surface sweeping method for surface movement in three dimensional topography simulations.

Communications

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mussa A Shaawat whose telephone number is (571) 272-3785. The examiner can normally be reached on Monday-Friday (8:30am to 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean R Homere can be reached on (571) 272-3780. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mussa Shaawat
Patent Examiner
November 12, 2004

JEAN B. HOMERE
PRIMARY EXAMINER